

Case 3703***Nautilus pompilius* Linnaeus, 1758 (Mollusca, Cephalopoda, Nautilida): proposed designation of a neotype**

Svetlana V. Nikolaeva

International Commission on Zoological Nomenclature, Natural History Museum (NHM), London SW7 5BD, U.K.; Borissiak Paleontological Institute, Russian Academy of Sciences, ul. Profsoyuznaya 123, Moscow, 117997 Russia; Kazan Federal University, ul. Kremlyovskaya 4/5, Kazan, 420008 Russia (e-mail: s.nikolaeva@nhm.ac.uk)

W. Bruce Saunders

Department of Geology, Bryn Mawr College, Bryn Mawr, PA 19010 (e-mail: wsaunder@brynmawr.edu)

Royal Mapes

Department of Biological Sciences, Ohio University, Irvine Hall, Athens, OH 45701, U.S.A. (e-mail: mapes@ohio.edu)

A. Louise Allcock

Ryan Institute and School of Natural Sciences, National University of Ireland, Galway, University Road, Galway, Ireland (e-mail: louise.allcock@nuigalway.ie)

Abstract. The purpose of this application, under Article 75.5 of the Code, is to set aside all type fixations for *Nautilus pompilius* Linnaeus, 1758, and to designate a neotype. The type series of *N. pompilius* includes specimens in the Linnean Society of London, the University Museum in Uppsala, and specimens figured by pre-Linnaean authors indicated by reference by Linnaeus (1758). The original material includes juveniles, specimens with unknown provenance, modified specimens and carved ornaments. Given the poor quality of the material and the lack of clarity as to its type status, we apply to the Commission asking to set aside all previous type fixations and designate a neotype. The neotype designation is of utmost importance for accurate identification of this species, which is necessary for its trade control and protection.

Keywords. Nomenclature; taxonomy; Nautilida; *Nautilus pompilius*; Ambon; neotype.

1. Linnaeus (1758, p. 709) described the new genus and species *Nautilus pompilius*. In his original description (Fig. 1) he included only references to publications containing illustrations of *N. pompilius*, although it is known that he also dealt with original specimens of this species, as *N. pompilius* shells were present in the collection of molluscs given to the University of Uppsala in 1746, during Linnaeus' time, by

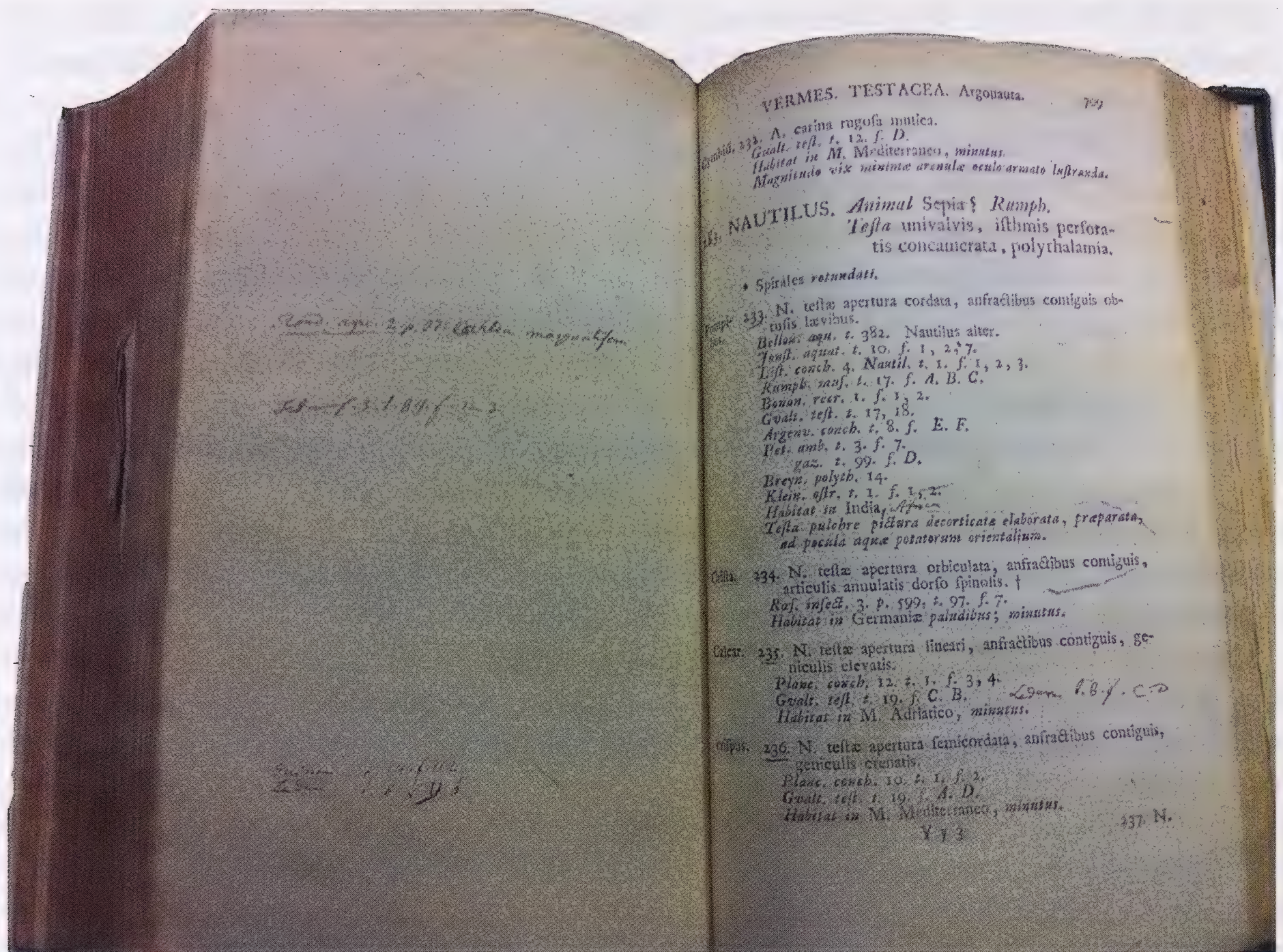


Fig. 1. A photograph of the annotated copy of Linnaeus (1758, p. 709) at the Linnean Society of London. The original description contains no mention of any actual specimens of *Nautilus pompilius*, but contains 10 references to previously published illustrations.

Eric Petreus (Thunberg, 1787, p. 13). It was usual for Linnaeus not to mention in the editions of the *Systema Naturae* whether there were actual specimens of a species that he had seen or were in his collection (A. Gentry, pers. comm.). According to Article 72.4.1.1 of the Code, the type series consists of all the specimens included by the author in the new nominal taxon at the time of description (whether directly or by bibliographic reference), and any evidence, published or unpublished, may be taken into account to determine what specimens are included. Nikolaeva (2015) studied the type series of *N. pompilius*, but was not able to locate with certainty any specimens figured by pre-Linnaean authors and indicated by reference by Linnaeus (1758), and some pre-Linnaean illustrations referenced by him were shown to be artistic impressions or copies of earlier images. One possible syntype is housed in the Linnean Society of London (see para 12). Possible type specimens could also survive in three Italian institutes, the Museo di Storia Naturale e del Territorio of the Università di Pisa, the Museo di Storia Naturale di Firenze and the Palazzo Pitti in Florence, as well as in some other museums elsewhere. All specimens figured by pre-Linnaean authors indicated by reference by Linnaeus (1758) are also part of the type series. To our knowledge none of the surviving specimens has been formally designated as lectotype, although some of the specimens illustrated by authors cited by Linnaeus have been designated as lectotypes. The bibliographical references and information about the specimens known to Linnaeus of this species are briefly summarized below (see Nikolaeva, 2015, for details).

2. Belon (1553, p. 382, unnumbered figure). The specimen figured by Belon as '*Nautilus alter*', is a partly broken adult shell showing chambers, septa and siphuncle; the shell is believed to be lost.

3. Jonston (1650, pp. 39, 40, pl. X, figs. 3–4, not 1, 2, 7 = *Argonauta*). The provenance and whereabouts of these specimens figured as '*Nautilus*' are not known, but it was confirmed that the figures are not copied from Aldrovandi (1606 and 1623).

4. Lister (1688, Volume IV, pl. 550, figs. 1, 3; pl. 551, fig. 3a). The whereabouts of the figured specimens (pl. 551, fig. 3a, unnamed and pl. 550, figs. 1, 3 figured as '*Nautilus caudatus*') is unknown, although many of the other shells illustrated in Lister's Volumes came from Sir Hans Sloane's shell collections. A recent search of Sloane's shell collections in the Natural History Museum (London) (March 2015) has revealed three cephalopod specimens (two etched *Nautilus* shells and one *Argonauta* shell). These shells are not recorded in Wilkins' (1957) catalogue of Sloane's specimens, nor do any of them resemble Lister's figures. For the publication dates of Lister's Volume and plates see Wilkins (1957) and Roos (2012).

5. Rumphius (1705, pl. 17, figs. A, B, C). Rumphius (1705, p. 59) was the first to describe *Nautilus pompilius* (as '*Nautilus major, sive crassus*'), and illustrations included in his *D'Amboinsche Rariteitkamer* were known to prominent zoologists of the 18th and 19th century (Davis, 2010). Linnaeus cited three illustrations of *Nautilus* as they appear in Georg Eberhard Rumphius' *D'Amboinsche Rariteitkamer* (1705, pl. 17). The same illustrations were reprinted in 1740 and 1741 editions of *D'Amboinsche Rariteitkamer* (Rumphius, 1740, 1741) and in *Thesaurus Imaginum* (Rumphius, 1711, 1739). The plate includes images of three different specimens illustrated by Maria Sibylla Merian and Pieter de Ruijter, and the whereabouts of all of these is unknown (Beekman, 1999; Nikolaeva, 2015). Comparison of the original wash drawings showed that plate 17 in the *D'Amboinsche Rariteitkamer* is a combination of illustrations of three specimens, two of which were shells, and one was a preserved soft body (Nikolaeva, 2015). House (1987, p. 57) designated all three figures as types and 'holographs', which can be interpreted as a lectotype designation under Article 74.6 of the Code (Fixation of lectotype by inference of 'holotype' or 'the type' before 2000) of this species, evidently believing that they depict one specimen. However, this designation is invalid because it included more than one specimen. Most of Rumphius' original material was destroyed in a fire in 1687 (Strack, 1993; Strack & Goud, 1996). Some Rumphian specimens were bought prior to that, in 1682, by Grand-Duke of Tuscany Cosimo III de' Medici, and were later transferred to the Museo di Fisica e Storia Naturale di Firenze (Florence). The specimens were later mixed, and the original labels were destroyed; the new labels did not indicate the collector, the date, or the place of collection. In 2014 staff of the Florence Museum confirmed that no Rumphian specimens of *Nautilus* were present in the collection (Cecilia Volpi & Luca Bartolozzi, pers. comm.). Godée Molsbergen (1931) suggested that some shells incorporated in a decorative mosaic table at the Palazzo Pitti in Florence were from Rumphius' collection (possibly types).

6. Buonanni (1684, figs. 1 and 2). The figures (referred to in the index as '*Nautilus*') were almost definitely copied from the original etching by Wenceslaus Hollar (Pennington, 1982). The whereabouts of Hollar's specimen is unknown.

7. Gualtieri (1742, pls. 17–18). It is believed that Gualtieri had in his possession some duplicates (? Linnaeus' future syntypes) from Rumphius and that these might

have been depicted in his 1742 book as '*Nautilus*' (Martelli, 1903; van Benthem Jutting, 1959; Dijkstra, 1997; Strack, 1993; Strack & Goud, 1996; Manganelli & Benocci, 2011). Gualtieri's collection is housed in the Museo di Storia Naturale e del Territorio of Pisa University (Coomans, 1992; Dijkstra, 1997, 1999; Sabatini, 2009). Only one *Nautilus* shell is currently present in this collection (Marco Dellacasa, pers. comm.). This is a polished shell with 29 visible phragmocone chambers, and it could be a specimen figured by Gualtieri in Fig. 4 of *Index testarum*, 1742. However, this is not a specimen figured in Rumphius' volume and hence not one of Linnaeus' syntypes, as Linnaeus did not refer to Gualtieri's Fig. 4.

8. DeZallier d'Argenville (1742, pl. 8, figs. E, F). The figured shells of 'Nautilles' came from the cabinet of curiosities of Joseph Bonnier de la Mosson (1702–1744) (Bleichmar, 2012, p. 101). The name of Bonnier de la Mosson is identified at the bottom of Plate 8, which shows six shells from the collection, and one *Nautilus* shell is shown from two sides at the very bottom of the page. These specimens are believed to be lost.

9. Petiver (1713, pl. 3, fig. 7). The illustration (referred to as '*Nautilus major, sive crassus*') is a copy of Merian's drawing used in Rumphius (1705), see para. 5.

10. Breyne (1732, pp. 14–15, pl. 1). This is a sectioned specimen (referred to as '*Nautilus alter*'), with 25 chambers, probably from the Danzig (Gdansk) collection. Breyne gave a list of synonyms ('*N. caudatus*', '*N. magnus*', '*N. fasciatus*', and '*N. major, sive crassus*'). The whereabouts of this specimen is unknown.

11. Klein (1753, pl. 1, figs. 1 and 2). These are views of a small shell, with normal nautiloid ornamentation, intact aperture and the umbilicus not covered by callus (referred to as '*Nautilus major crassus*'). The specimen was most likely from Klein's own curiosity cabinet and is believed to be lost.

12. Linnaeus' collection at the Linnean Society of London has one specimen of *Nautilus pompilius*. It is catalogued and has a partly printed and partly handwritten label signed by S.P. Dance in 1963. The label refers to the original reference in Linnaeus (1758) and a reference to subsequent sources, i.e. Linnaeus (1767), Hanley (1855) and Dodge (1953). Linnaeus (1758) did not mention any actual specimens of *N. pompilius*, while Linnaeus (1764, p. 549; 1767, p. 1161) mentioned specimen no. 149 (now specimen no. 880 in the Uppsala Museum). The specimen in the Linnean Society represents a young individual of ca. 5 cm in diameter with an open umbilicus and a filed (cut and polished) aperture. The filed aperture was mentioned by Dance (1967) and he cited this specimen as one that had been isolated by Hanley (1855), probably the same species as one figured by Martini (1769), although the umbilicus in the young specimen in the Linnean collection is open, while in Martini's specimen it is covered by black callus. However, no mention of the specimen now in the Linnean Society can be found in Linnaeus (1758, 1767) or Gmelin (1791). It is possible that this specimen was part of the type series, but because it is a young shell with an open umbilicus and its aperture is filed, it is not a suitable candidate for lectotype designation.

13. Only Linnaeus' own specimens came to London, and not those that had belonged to King Adolf Fredrik and Queen Louisa Ulrika of Sweden, those in the Royal Academy in Stockholm, or those contained in a series of donations given to the Uppsala Museum during Linnaeus' time (Targioni Tozzetti, 1890, p. 25; Smith, 1832, pp. 111–114; Myrin, 1833, pp. 238–262; Jackson, 1890, p. 25; Löwegren, 1952,

pp. 234–236). Four specimens of *N. pompilius* in the Uppsala University Museum (Wallin, 2001) appear to be original Linnaean syntypes. Two Uppsala specimens are subadult shells, and another is decorated by etching and has been broken. The remaining Uppsala specimen is an adult *Nautilus*, but it is not certain whether Linnaeus saw it prior to 1758. Specimen no. 87 (a decorated shell) was in the collection of molluscs given to the University of Uppsala in 1746, during Linnaeus' time, by Eric Petreus (Thunberg, 1787, p. 13). Thunberg (1787) only mentioned one specimen without describing it, but Löwegren (1952, pp. 196–198) and Holm (1957, pp. 33–35) both give descriptions of the Petreus collection and the history of its acquisition. The illustration of this specimen in Holm (1957, text-fig. 3) shows a decorated shell of *N. pompilius* ('Linnean collection No. 87'), presently missing from the Uppsala collection (Erica Mejlön, pers. comm.). According to Holm (1957), after receipt of the large Gustaf Adolf collection, shells of the Petreus collection were treated as duplicates, never described by Linnaeus, and sent to Christiania (now Oslo) in 1825; only one engraved shell (specimen no. 87) was left in Uppsala, figured by Holm (1957, text-fig. 3). This specimen, even if found, would not be suitable for a lectotype designation because it has no periostracum, and is partly broken. No relevant Petreus specimens could be found in the Oslo University Museum, in the collection or on display (Vladimir Gusarov, pers. comm.). Specimen no. 880 is a large shell ca. 18 cm in diameter, with a complete aperture, closed umbilicus and a well-preserved characteristic colour pattern. The specimen was in Queen Louisa Ulrika's collection, listed by Linnaeus (1764, p. 549) under no. 149. Linnaeus (1767, p. 1161) noted that there was material in the collection ('MLU 549, n. 149'). However, this does not mean that the specimen was not present by 1758. In 1798 the collection of the Drottningholm Palace was divided and the dried material (plants and invertebrates) was transferred to the University Museum in Uppsala in 1803 (Thunberg, 1804; Löwegren, 1952, pp. 309–310). It is possible that Linnaeus handled specimen 880 before 1758, but there is no documentary evidence of that. Specimens numbered 1599a and 1599b were also in Gustaf Adolf's collection and it is possible that they were known to Linnaeus before 1758, but there is no documentary evidence of that either. These are two young shells, with almost closed umbilici, although in the smaller specimen (1599b) a remaining small opening can be observed. These two specimens of *N. pompilius* are listed in part 24 of Thunberg's catalogue (1804, p. 5). These specimens have been housed in the Uppsala Museum since 1798. They are also listed by Wallin (2001).

14. Saunders et al. (in prep.) are describing living specimens of *Nautilus pompilius* trapped off Ambon, Molucca Islands (N=44), and from a separate population (N=64), ~1,500 km to the southwest, in the Sumbawa region of Indonesia. The Ambon specimens are from the area where Rumphius lived and wrote *D'Amboinsche Rariteitkamer* (1705), and described the area of occurrence of *Nautilus* as the seas of the Moluccan Islands as well as Batavia and Java. Linnaeus (1758) cited Rumphius' comments on occurrence and his illustrations. Thus, it is logical to interpret Ambon as the type locality for the species, and to use material from this area in selecting a neotype. Indonesian *Nautilus* may differ at the subspecies level and perhaps at the species level from that of documented living populations in the Philippines, Palau, Papua New Guinea, New Caledonia, American Samoa, Vanuatu, Australia and elsewhere. These relationships are still being worked out, pending genetic investigations (Wray et al.,

1995; Sinclair et al., 2007, 2011; Bonacum et al., 2011; Williams et al., 2012). Suitable and well documented live caught specimens (shells and soft parts) as well as topotype reference material from Ambon have been deposited at the Smithsonian Institution, Washington DC (USNM 816877 [AMB 16], proposed neotype) and at the American Museum of Natural History, NY (AMNH 79686 [AMB 5]; AMNH 79685 [AMB 12] and AMNH 79696 [AMB 8]). In 1987, shells and soft-parts were also deposited with the Indonesian Institute of Sciences (LIPI), Institute of Oceanography, in Ambon, and at the Biology Laboratory, University of Pattimura, Poka Campus, Ambon. The material from the Sumbawa region, Indonesia was deposited at Hasanuddin University, Department of Fisheries in Makassar, Sulawesi Island, Indonesia. The Sumbawa material cannot leave the country because *Nautilus* shells are on the Indonesian Endangered Species list and cannot be shipped out of the country unless they are 'objets d'art'. However, morphometric data on the 64 Sumbawa specimens are available and tissue samples collected in the field have been processed for DNA and are being reported by Saunders et al. (in prep.).

15. Four additional subspecies of *Nautilus pompilius* have been described. Three (*N. pompilius moretoni*, *N. pompilius marginalis* and *N. pompilius perforatus*) were described by Willey (1897) from Papua New Guinea; no type material has been located for these subspecies, and because of the potential for substantial drift of empty dead shells, their actual geographic origin is uncertain. They were all considered variants of *N. pompilius*, and as species dubia by Saunders (2009). A fourth described subspecies, *N. pompilius suluensis* Habe & Okutani, 1988, was described from Tubbataha Reef, the Sulu Sea, near Palawan (Parawan) Island in the Philippines. The holotype is deposited in the National Science Museum Tokyo (NSMT Mo-64608) and presumed topotypes are figured by Saunders (2009, figs. 3c, d). Although soft parts and genetic data for this subspecies are unknown, this taxon probably merits species rank (see below). Molecular studies have shown Indonesian material to be different at the subspecies level and probably at the species level from material from Papua New Guinea, Northeast Australia, the Coral Sea, Fiji, Vanuatu and American Samoa (Sinclair et al., 2007, 2011; Bonacum et al., 2011; Williams et al., 2012). Mitochondrial genes have shown clear separation between material from six general locations: (1) Fiji, (2) Vanuatu, (3) American Samoa, (4) Coral Sea Islands (including Osprey Reef, Shark Reef and Bougainville Reef), (5) Papua New Guinea and the Great Barrier Reef (including Port Moresby, Admiralty Islands, Mantis Reef, Wishbone Reef, Carter Reef) and (6) Indonesia, Western Australia, Philippines and Palau (Sinclair et al., 2007, 2011; Bonacum et al., 2011; Williams et al., 2012). Using approximate Bayesian Computation analysis, it has further been shown that the apparent lack of genetic divergence between Western Australia and Philippine populations is because of limited genetic drift in these isolated populations since their separation rather than gene exchange (Williams et al., 2015), potentially supporting the Philippines as separate from an Indonesia/Western Australia clade.

16. According to Article 75.5 of the Code, replacement of unidentifiable name-bearing types with a neotype requires an application to the International Commission on Zoological Nomenclature. An identifiable type specimen is necessary to correctly identify the species in order to estimate the demographic parameters and geographical range of this species, to stabilize the nomenclature and thus allow the description of other species from Australia and the IndoWest Pacific, and to define sustainable

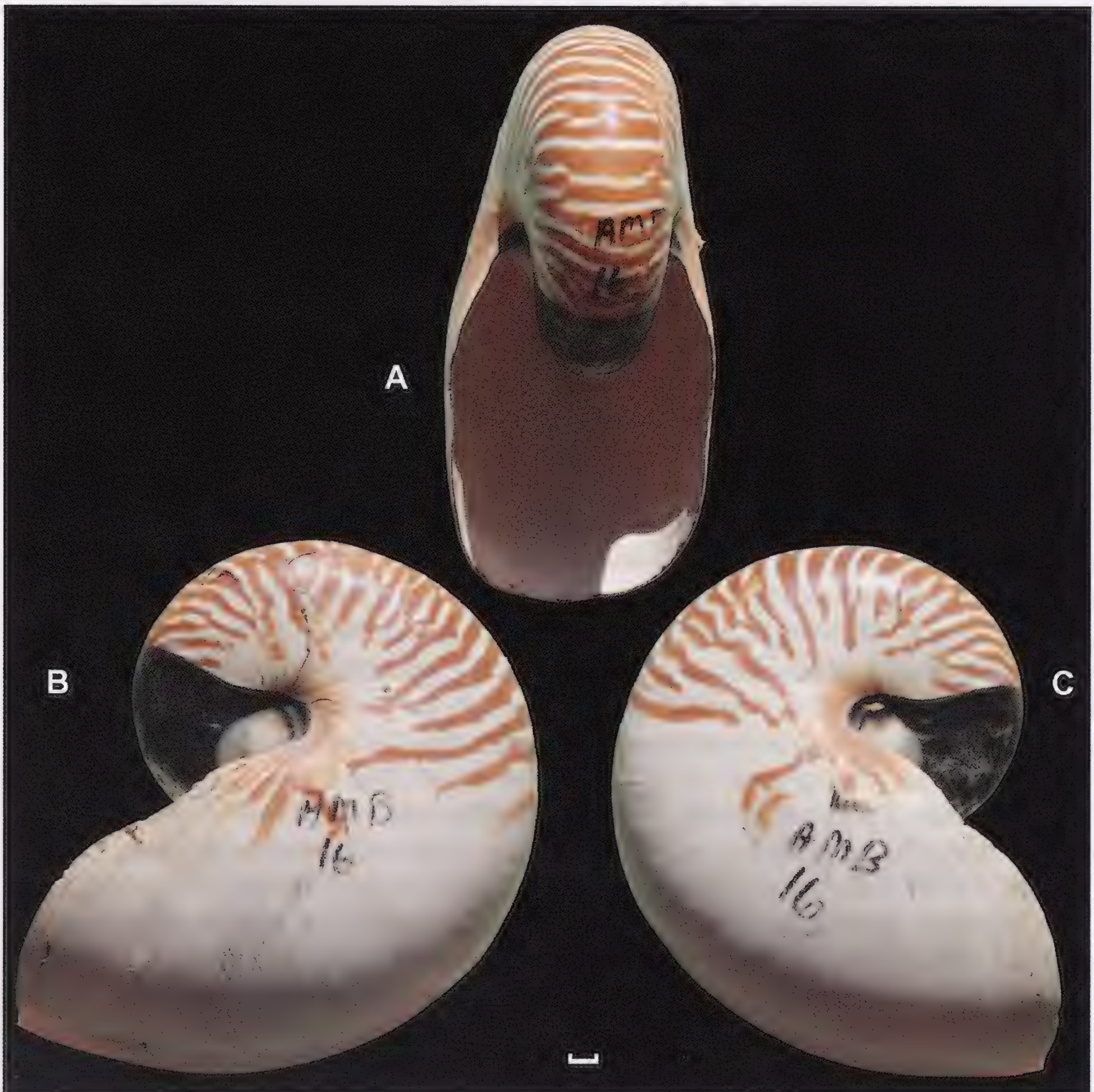


Fig. 2. Proposed neotype of *Nautilus pompilius* Linnaeus, 1758 (USNM 816877 [AMB 16]) from Ambon, deposited at the Smithsonian Institution, Washington DC; (A) apertural view, (B, C) lateral views. Scale bar 10 mm.

catch levels and conservation protocols for species within this genus. The neotype designation is urgently needed for the IUCN red list assessments for *N. pompilius*, which are very difficult in the absence of an identifiable type specimen with known provenance, as well as for trade regulations for this species by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) (De Angelis, 2012). This situation certainly meets conditions of Article 75.3.1 of the Code (a neotype is validly designated when there is an exceptional need and only when that need is stated expressly).

17. We propose specimen USNM 816877 [AMB 16] (Fig. 2) housed in the Smithsonian Institution's collections to be the neotype and for which we also have DNA and preserved soft tissues in isopropyl alcohol. The soft tissue of USNM 816877 is in the USNM alcoholic collections which are stored separately and it (the tissue) has the same number as the shell. The qualifying conditions of Article 75.3 of

the Code are met. Molecular sequence data from this specimen for 412 bases of the mitochondrial cytochrome oxidase I (COI) gene, and 398 bases of the mitochondrial large ribosomal subunit (16S rRNA) gene are published in Genbank under accession numbers KC539924 and KC539895 respectively. The molecular sequence data, as well as the colour pattern and shell and soft body morphology, of the proposed neotype, will differentiate the nominal species-group taxon from other taxa (as per Article 75.3.2 of the Code). The available data and description are sufficient to ensure recognition of the specimen designated (as per Article 75.3.3 of the Code). The proposed neotype is consistent with what is known on the shell pattern and morphology of the syntypes and from other sources and agree with the prevailing usage (as per Article 75.3.5 of the Code). The proposed neotype specimen was recovered from traps set on the bottom at ~300 m depth by W.B. Saunders and L.C. Hastie on 1 August 1987. The Ambon trap site is located ~6 km southwest of Ambon City, Ambon Island, Molucca Islands (Maluku Province), just off the small coastal village of Eri, hence the proposed neotype came as nearly as practicable from the original type locality (Article 75.3.6 of the Code). Specimen USNM 816877 [AMB 16] (Fig. 2) is housed in the Smithsonian Institution and is accessible for study (Article 75.3.7 of the Code).

18. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to set aside all previous type fixations for the name *pompilius* Linnaeus, 1758, as published in the binomen *Nautilus pompilius*, and to designate as neotype specimen USNM 816877 (AMB 16), as specified in para. 17 above;
- (2) to place on the Official List of Species Names in Zoology the name *pompilius* Linnaeus, 1758, as published in the binomen *Nautilus pompilius* Linnaeus, 1758 and as defined by the neotype designated in (1) above.

References

(Square brackets indicate that the pages are not numbered in the publication)

- Aldrovandi, U.** 1606. *De reliquis animalibus exanguibus libri quatuor. post mortem eius editi: nempe de mollibus, crustaceis, testaceis, et zoophytis.* [6], 593, [28]. Giovanni Battista Bellagamba, Bologna.
- Aldrovandi, U.** 1623. *De reliquis animalibus exanguibus libri quatuor. post mortem eius editi: nempe de mollibus, crustaceis, testaceis, et zoophytis.* [8], 92 pp., [16], 18 pls. J. Hofer for J. Treudel, Frankfurt (Main).
- Belon, P.** 1553. *Bellonii Cenomani De aquatilibus, libri duo cum [epsilon, iota] conibus ad viam ipsorum effigiem, quoad eius fieri potuit, expressis. . .* 448 pp. Apud C. Stephanum, Parisiis.
- Beekman, E.M.** 1999. *The Ambonese Curiosity Cabinet. Georgius Everhardus Rumphius; Translated, edited, annotated, and with an introduction by E.M. Beekman.* cxii, 567 pp. Yale University Press, New Haven, London.
- Bentham Jutting, W.S.S. van.** 1959. Rumphius and Malacology. Pp. 181–207 in H.C.D. de Wit (Ed.), *Rumphius memorial volume*, Baarn.
- Bleichmar, D.** 2012. Learning to look: visual expertise across art and science in eighteenth-century France. *Eighteenth-Century Studies*, **46**(2): 85–111.
- Bonacum, J., Landman, N.H., Mapes, R.H. et al.** 2011. Evolutionary radiation of present-day *Nautilus* and *Allonautilus*. *American Malacological Bulletin*, **29**: 77–93.
- Breyne, J.P.** 1732. *Dissertatio physica de Polythalamiiis, nova testaceorum classe. Cui quaedam praemittuntur de methodo testacea in classes et genera distribuendi. Huic adiicitur commentatiuncula de Belemnitis Prussicis; tandemque schediasma de Echinis methodice disponendis. . .* [7], 64 pp. Apud Cornelium a Beughem, Gedani.

- Buonanni, F.** 1684. *Recreatio mentis, et oculi in observatione animalium testaceorum curiosis naturae inspectoribus italico sermone primum proposita. A.P. Philippo Bonanno Societatis Jesu. Nunc denuò ab eodem Latinè oblata, centum additis Testaceorum Iconibus, circaquae varia problemata proponuntur.* Ex Typographia Varesij, Romae, xvi, 270, [10] pp., 139 pls.
- Coomans, H.E.** 1992. "Schelpenverzamelingen." Pp. 192–203 in Bergvelt, E. & Kistemaker, R. *Nederlandse kunst- en rariteitenverzamelingen, 1585–1735. Deel 1.* Amsterdam/Zwolle.
- Dance, S.P.** 1967. Report on the Linnaean shell collection. *Proceedings of the Linnean Society of London*, **178**(1): 1–24.
- Davis, R.A.** 2010. Nautilus studied the first twenty-two centuries. Pp. i lxxvii, 321 *In: Nautilus. The biology and paleobiology of a living fossil.* Reprint with additions. Springer, Dordrecht, Heidelberg, London, New York. (The first edition was published by Plenum Press, New York in 1987).
- De Angelis, P.** 2012. Assessing the impact of international trade on chambered nautilus. *Geobios*, **45**(1): 5–11.
- Dezallier d'Argenville A.-J.** 1742. *L'histoire naturelle éclaircie dans deux de ses parties principales, la lithologie et la conchyliologie : dont l'une traite des pierres et l'autre des coquillages : ouvrage dans lequel on trouve une nouvelle méthode & une notice critique des principaux auteurs qui ont écrit sur ces matières : enrichi de figures dessinées d'après nature.* [8], 491 pp., 33 pls. Chez de Bure l'Aîne, Paris.
- Dezallier d'Argenville A.-J.** 1757. *L'Histoire naturelle éclaircie dans une de ses parties principales, la Conchyliologie qui traite des Coquillages de mer, de rivière et de terre : ouvrage augmente de la Zoomorphose, ou représentation des Animaux à Coquilles avec leurs explications.* Nouvelle edition. Two parts. xxii, 394, 84, cvii pp., 41 pls. Chez de Bure l'Aîne, Paris.
- Dijkstra, H.H.** 1997. Part 6. Mollusca, Bivalvia, Pectinidae. *In: Results of the Rumphius Biohistorical Expedition to Ambon.* Nationaal Natuurhistorisch Museum, Leiden (*Zoologische Mededelingen*, **71**(27)): 313–343.
- Dijkstra, H.H.** 1999. Type specimens of Pectinidae (Mollusca: Bivalvia) described by Linnaeus 1758–1771). *Zoological Journal of the Linnean Society*, **125**: 383–443.
- Dodge, P.** 1953. A historical review of the mollusks of Linnaeus. Part 1, The classes Loricata and Pelecypoda. Part 2, The class Cephalopoda and the genera *Conus* and *Cypraea* of the class Gastropoda. *Bulletin of the American Museum of Natural History*, **103** (article 1): 1–134.
- Gmelin, J.-F.** 1791. *Caroli a Linné, Systema Naturae per regna tria naturae.* Ed. 13, vol. 1. Part 6. *Vermes Testacea.* 3021–3910 pp. Lipsiae.
- Godée Molsbergen, E.C.** 1931. Rumphius' schelpen te Florence. *Mededeelingen van het Nederlandsch Historisch Instituut te Rome 's-Gravenhage.* Tweede Reeks, **deel I**: 162–167.
- Gualtieri, N.** 1742. *Index testarum conchyliorum quae adservantur in museo Nicolai Gualtieri.* xxiii pp., 111 ff. Florence.
- Habe, T. & Okutani, T.** 1988. A new subspecies of living Nautilus (Cephalopoda: Nautiloidea) from the Sulu Sea. *Venus*, **47**(2): 91–94.
- Hanley, S.C.T.** 1855. *Ipsa Linnaei conchyliæ: The shells of Linnaeus, determined from his manuscripts and collections ; also, an exact reprint of the Vermes testacea of the 'Systema naturae' and 'Mantissa'.* [i], 556, [1] p., 5 leaves of col. plates. Williams & Norgate, London.
- Heppel, D.** 1995. The long dawn of malacology: a brief history of malacology from prehistory to the year 1800. *Archives of Natural History*, **22**(3), 301–319.
- Holm, Å.** 1957. Specimina Linnaeana. I Uppsala bevarade zoologiska samlingar från Linnés tid. 68 pp. *Uppsala Universitets Årsskrift* (Acta Universitatis Upsaliensis).
- House, M.** 1987. Geographic Distribution of *Nautilus* Shells. Pp. 53–64 *in: Nautilus. The biology and Paleobiology of a living fossil.* Plenum press. New York (reprinted in 2010 by Springer, Dordrecht, Heidelberg, London, New York).
- Jackson, B.D.** 1890. History of the Linnean collections, prepared for the centenary of the Linnean Society. *Proceedings of the Linnean Society of London*, **1890**, 1834.

- Jonston, J.** 1650. *Historiae naturalis de exanguibus aquaticis libri IV, cum figuris aeneis, Joannes Jonstonus, Med. D. concinnavit. impendio.* 78, [6] pp., 20 pls. Matthaei Meriani, Frankfurt-am-Main.
- Klein, J.T.** 1753. Pl. 1, figs. 1 & 2 in: *Tentamen methodi ostracologicae : sive Dispositio naturalis cochlidum et concharum in suas classes, genera et species, iconibus singulorum generum aeri incisus illustrata ; accedit lucubratiuncula de formatione, cremento et coloribus testarum quae sunt cochlidum et concharum.* [2], 177, [35], 44, 16, [2] pp. Apud G.J. Wishoff, Lugduni Batavorum.
- Linnaeus, C.** 1758. *Systema Naturae*, Ed. 10, vol. 1. 824 pp. Salvii, Holmiae.
- Linnaeus, C.** 1764. *Museum S:ae R:ae M:tis Ludovicae Ulrica Reginae.* Salvii, Holmiae. Svecorum, Gothorum, Vandalorumque . . . in quo Animalia rariora, exotica, imprimis Insecta & Conchilia describuntur & determinantur. Prodrumi instar editum. Literis & impensis Direct. Laur. Salvii, Holmiae, [6], 720, [2]; 110, [1] pp. (Linnaeus' descriptions of the Queen's collection at Drottningholm Palace. Invertebrates. Mollusc specimens referred to as "M.L.U." in the *Systema Naturae*, other groups as "Mus. Lud. Ulr.").
- Linnaeus, C.** 1767. *Systema Naturae*, Ed. 12, vol. 1, part 2. 533–1327 pp. Salvii, Holmiae.
- Lister, M.** 1688. *Historiae sive synopsis methodical conchyliorum.* Liber IV. Published by the author, London, pl. 550, figs. 1, 3; pl. 551, fig. 3 (the publication date of the first edition after Wilkins (1957)).
- Löwegren, Y.** 1952. *Naturaliekabinett i Sverige under 1700-talet. Ett bidrag till zoologiens historia.* 407 pp. Skånska Centraltryckeriet, Lund.
- Manganelli, G. & Benocci, A.** 2011. Niccolò Gualtieri (1688–1744): biographical sketch of a pioneer of conchology. *Archives of Natural History*, **38**(1): 174–177.
- Martelli, U.** 1903. *Le collezioni di Giorgio Everardo Rumpf acquistate dal granduca Cosimo 3 de' Medici una volta esistenti nel Museo di fisica e storia naturale di Firenze estratto da un catalogo manoscritto dal Prof. Giovanni Targioni-Tozzetti.* 213 pp. Tipografia Luigi Niccolai, Florence.
- Martini, F.H.W.** 1769. *Neues systematisches Conchylien-Cabinet / geordnet und beschrieben von Friedrich Heinrich Wilhelm Martini und unter dessen Aufsicht nach der Natur gezeichnet und mit lebendigen Farben erleuchtet*, vol. 1. [18], xxviii, 408 pp., 31 pls. Nicolaus Raspe, Nürnberg.
- Myrin, C.G.** 1833. Om Linnés naturhistoriska samlingar och deras bortförande till England. *Skandia. Tidskrift för Vetenskap och konst, utgiven av Svenska Litteratur-föreningen i Uppsala*, **2**: 242–288.
- Nikolaeva S.V.** 2015. A study of the type series of *Nautilus pompilius* Linnaeus, 1758 (Mollusca, Cephalopoda, Nautilida). *Zootaxa*, **3963**(1): 055–073.
- Pennington, R.** 1982. *A descriptive catalogue of etched work of Wenceslaus Hollar 1607–1677.* 502 pp. Cambridge University press, Cambridge.
- Petiver, J.** 1713. *Aquatilium animalium Amboinae, & c. Icones & nomina. Containing near 400 figures, engraven copper plates of aquatick crustaceous and testaceous animals; as lobsters, crawfish, prawns, shrimps, sea-urchins, eggs, buttons, . . . found about Amboina, and the neighbouring Indian shores, with their Latin, English, Dutch, and native names.* 4 pp., 20 pls. London.
- Roos, A.-M.** 2012. The art of science: a 'rediscovery' of the Lister copperplates. *Notes and Records of the Royal Society of London*, **66**: 19–40.
- Rumphius, G.E.** 1705. *D'Amboinsche rariteitkamer, behelzende eene beschryvinge van allerhande zoo weeke als harde schaalvisschen, te weeten raare krabben, kreeften, en diergelyke Zeedieren, als mede allerhande hoorntjes en schulpen, die men in d'Amboinsche Zee vindt: Daar beneven zommige mineraalen, gesteenten, en soorten van aarde, die in d'Amboinsche, en zommige omleggende Eilanden gevonden worden.* [xxviii], 340, [43] pp., 60 pls. François Halma, Amsterdam.
- Rumphius, G.E.** 1711. *Thesaurus Imaginum Piscium Testaceorum : quales sunt Cancri, Echini, Echinometra, Stellæ Marinæ, &c., ut & cochlearum . . . quibus accedunt conchyilia ut Nautilus, Cornu Ammonis, &c., Conchæ univalviæ & bivalviæ . . . denique Mineralia : uti Metalla, Lapides & Argillæ, variis in locis reperta, & c. Petrum vander Aa.* [ii], 15, [8] pp., 60 pls. Lugduni Batavorum.

- Rumphius, G.E.** 1739. *Thesaurus imaginum piscium testaceorum: quales sunt cancri, echini, echinometra, stellæ marinæ, &c., ut & cochlearum . . . quibus accedunt Conchylia ut Nautilus, Cornu Ammonis, &c., Conchæ univalviæ & bivalviæ . . . denique Mineralia : uti Metalla, Lapides & Argillæ, variis in locis reperta, & c.*, [iv], 14, [8] pp., 60 pls. Hagae-Comitum.
- Rumphius, G.E.** 1740. *D'Amboinsche rariteitkamer, behelzende eene beschryvinge van allerhande zoo weeke als harde schaalvisschen, te weete raare krabben, kreeften, en diergelyke Zeedieren, als mede allerhande hoorntjes en schulpen, die men in d'Amboinsche Zee vindt: Daar benevens zommige mineraalen, gesteenten, en soorten van aarde, die in d'Amboinsche, en zommige omleggende Eilanden gevonden worden.* [xxviii], 340, [43] pp., 60 pls. Jan Roman de Jonge, Amsterdam.
- Rumphius, G.E.** 1741. *D'Amboinsche rariteitkamer, behelzende eene beschryvinge van allerhande zoo weeke als harde schaalvisschen, te weeten raare krabben, kreeften, en diergelyke Zeedieren, als mede allerhande hoorntjes en schulpen, die men in d'Amboinsche Zee vindt: Daar beneven zommige mineraalen, gesteenten, en soorten van aarde, die in d'Amboinsche, en zommige omleggende Eilanden gevonden worden.* [xx], 340, [43] pp., 60 pls. Jan Roman de Jonge, Amsterdam.
- Sabatini, S.** 2009. La galleria storica. Pp. 25–30 in Barbuti, R. & Landini, W. (Eds.), *Il Museo di Storia Naturale e del Territorio dell'Universita di Pisa*. Pisa.
- Saunders, W.B.** 2010. The species of *Nautilus*. Pp. 35–52 in Saunders, W.B. & Landman, N.H. (Eds.), *The biology and paleobiology of a living fossil*. Reprint with additions. Springer, Dordrecht, Heidelberg, London, New York. (The first edition was published by Plenum Press, New York in 1987).
- Saunders, W.B. & Landman, N.H.** 2010. *Nautilus* and *Allonautilus*: Two decades of progress. Pp. lxxvii, xxxvi-lxxvii in Saunders, W.B. & Landman, N.H. (Eds.), *The biology and paleobiology of a living fossil*. Reprint with additions. Springer, Dordrecht, Heidelberg, London, New York. (The first edition was published by Plenum Press, New York in 1987).
- Saunders, W.B., Mapes, R.H. White, M. & Hastie, L.C.** (in prep.). Review of Populations of *Nautilus pompilius pompilius* Linnaeus, 1758, from the type area, Ambon, Molucca (Moluku) Islands and from the Sumbawa Island region, Indonesia.
- Sinclair, B., Briskey, L., Aspden, W. & Pegg, G.** 2007. Genetic diversity of isolated populations of *Nautilus pompilius* (Mollusca, Cephalopoda) in the Great Barrier Reef and Coral Sea. *Reviews in Fish Biology and Fisheries*, **17**: 223–235.
- Sinclair, W., Newman, S.J., Vianna, G.M.S., Williams, S. & Aspden, W.J.** 2011. Spatial subdivision and genetic diversity in populations on the east and west coasts of Australia: the multi-faceted case of *Nautilus pompilius* (Mollusca, Cephalopoda). *Reviews in Fisheries Science*, **19**: 52–61.
- Smith, Lady.** (Ed.). 1832 *Memoir and correspondence of the late Sir J.E. Smith, Md.*, vol. 1. 610 pp. Longman, Rees, Orme, Brown, Green & Longman, London.
- Strack, H.L.** 1993. Results of the Rumphius biohistorical expedition to Ambon (1990). Part 1. General account and list of stations. *Zoologische Verhandelingen Leiden*, **289**: 172
- Strack, H.L. & Goud, J.** 1996. Rumphius and the “Amboinsche Rariteitkamer” by Hermann. *Vita Marina*, **44**(1–2): 29–39.
- Targioni Tozzetti, G.** 1903. *Le collezioni di Giorgio Everardo Rumpf acquistate dal Granduca Cosimo III de' Medici, una volta esistenti nel Museo di Fisica e Storia Naturale di Firenze*. 213 pp. Luigi Niccolai, Florence.
- Thunberg, C.P.** 1787. Donatio 1746 Erci Petrei. *Museum Naturalium Academiae Upsaliensis*. Part 1. 1213 pp. Edman, Uppsala.
- Thunberg, C.P.** 1804. Donatio 1803 Gustavi Adolphi. *Museum Naturalium Academiae Upsaliensis*. Parts 23–24. 24 pp. Edman, Uppsala.
- Wallin, L.** 2001. *Catalogue of type specimens. 4. Linnaean specimens*. [1], 1–128. Uppsala University, Museum of Evolution, Zoology Section, Uppsala.
- Wilkins, G.** 1957. Notes on the *Historiae Conchyliorum* of Martin Lister (1638–1712), *Journal of the Society for the Bibliography of Natural History*, **3**(4): 196–205.

- Williams, R.C., Newman, S.J. & Sinclair, W.** 2012. *DNA barcoding in Nautilus pompilius* (Mollusca : Cephalopoda): evolutionary divergence of an ancient species in modern times. *Invertebrate Systematics*, **26**: 548–560.
- Williams, R.C., Jackson, B.C., Duvaux, L., Dawson, D.A., Burke, T. & Sinclair, W.** 2015. The genetic structure of *Nautilus pompilius* populations surrounding Australia and the Philippines. *Molecular Ecology*, **24**: 3316–3328.
- Willey, A.** 1896. Zoological observations in the South Pacific, *Quarterly Journal Of Microscopical Science*, New Series No. **154**, (39(2)): 219–231.
- Woodley, J.D.** 1994. Anne Lister, illustrator of Martin Lister's *Historiæ Conchyliorum* (1685–1692). *Archives of Natural History*, **21**(2): 225–229.
- Wray, C.G., Landman, N.H., Saunders, W.B. & Bonacum, J.** 1995. Genetic divergence and geographic diversification in *Nautilus*. *Paleobiology*, **21**: 220–228

Acknowledgement of receipt of this application was published in BZN 72: 268.

Comments on this case are invited for publication (subject to editing) in the *Bulletin*; they should be sent to the Executive Secretary, I.C.Z.N., c/o Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk).